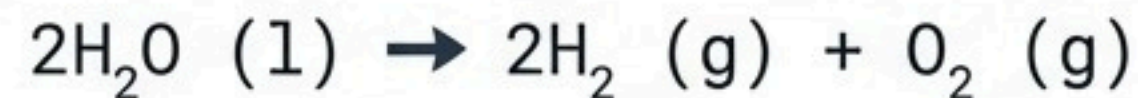
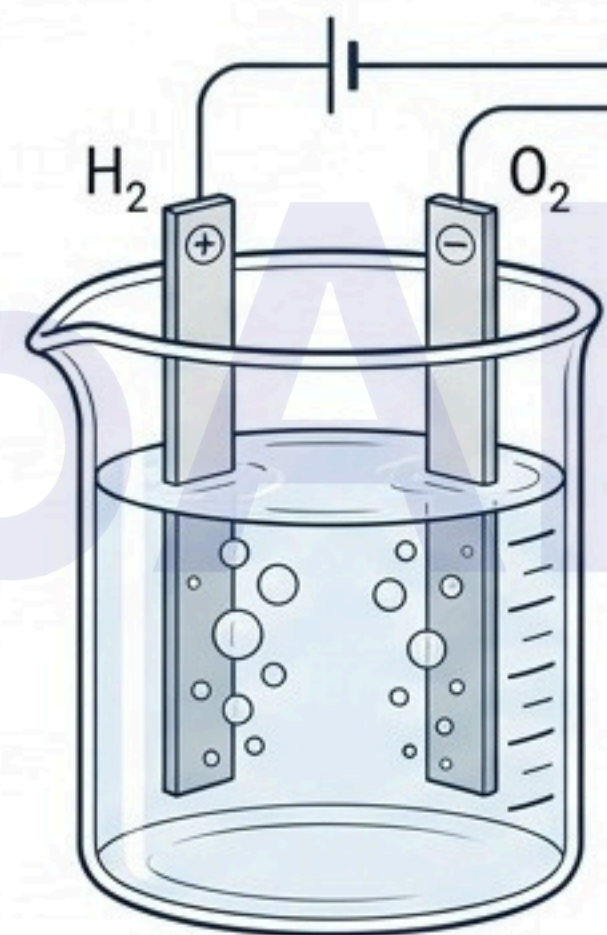
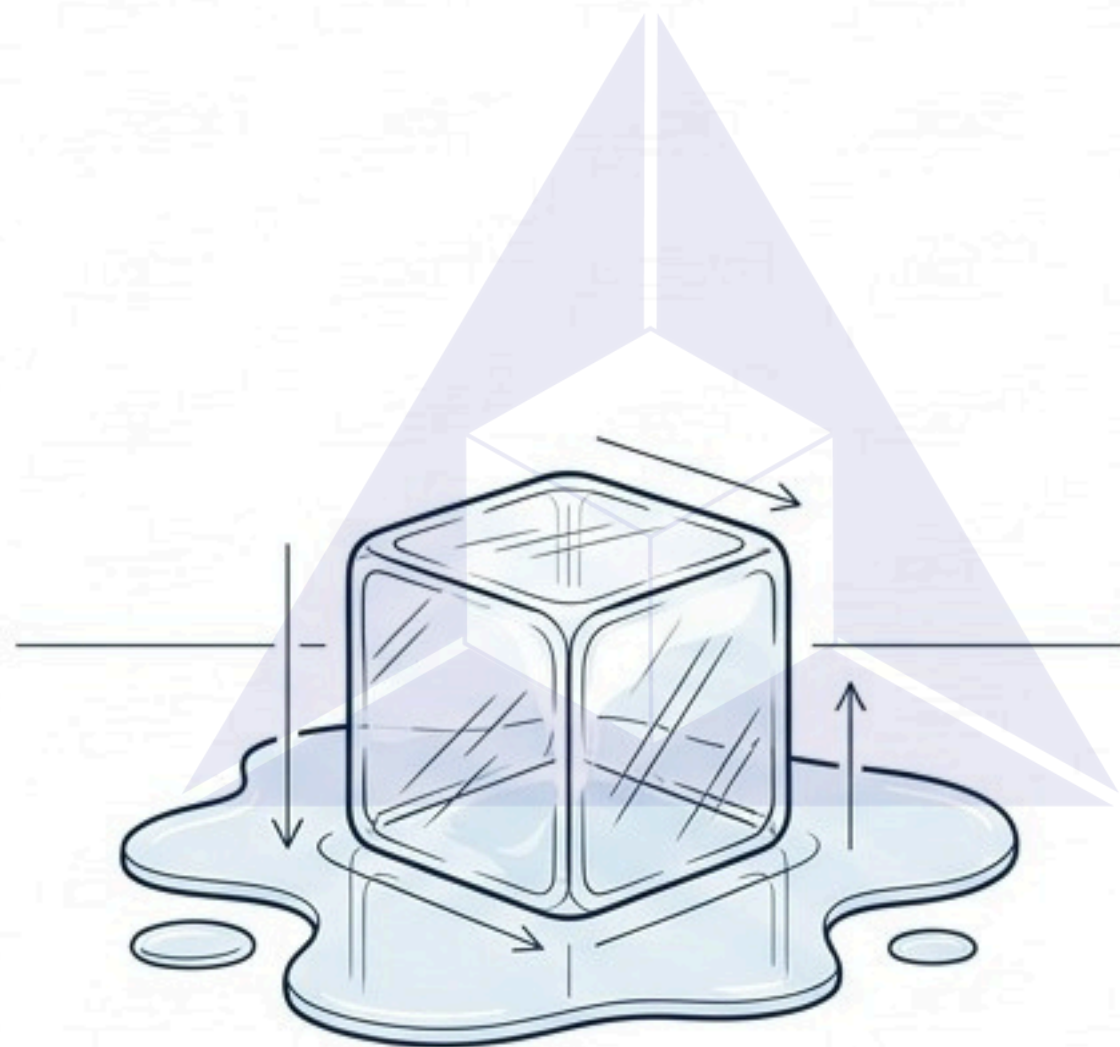


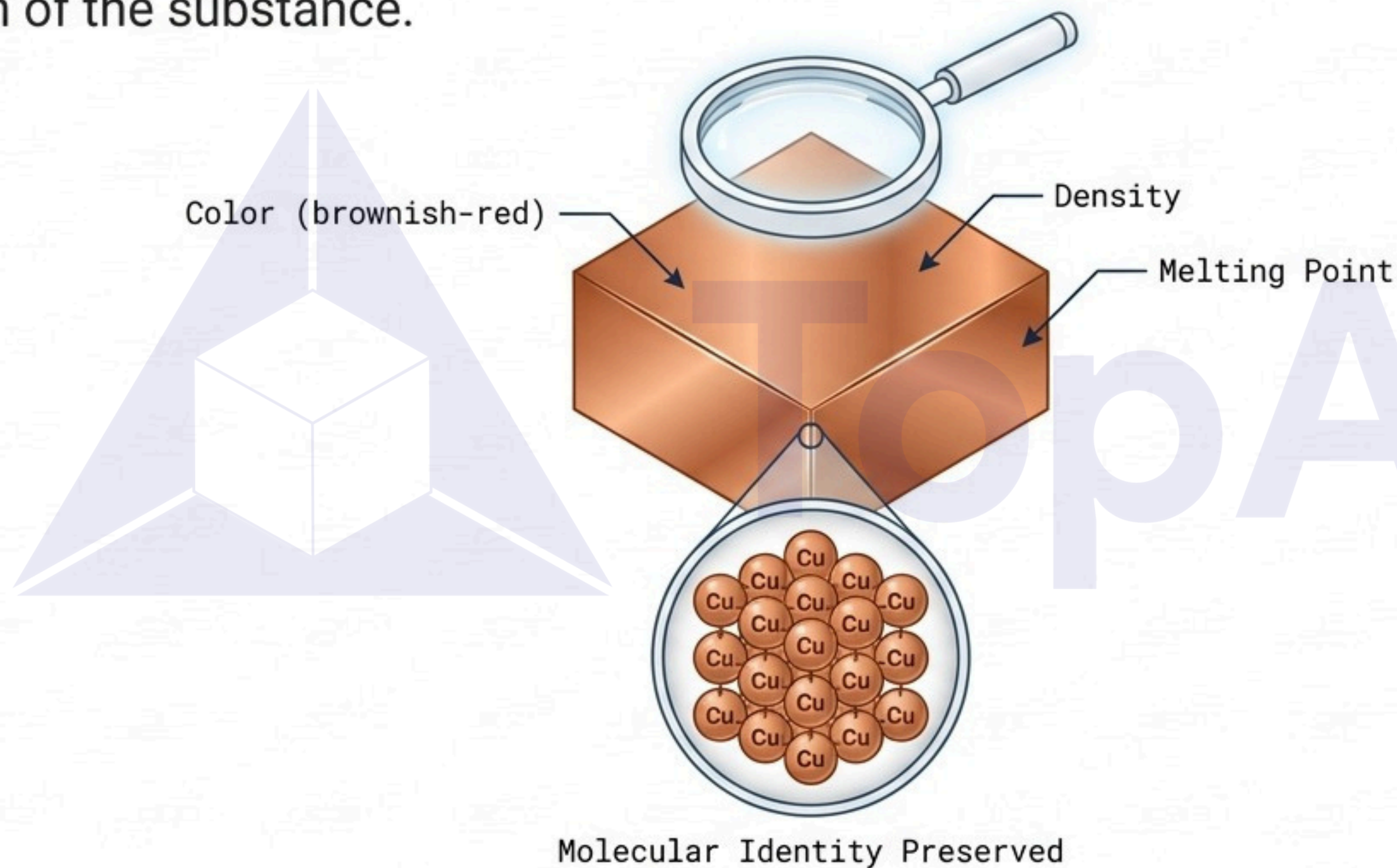
The Dual Nature of Matter

Physical vs. Chemical Properties



Physical Properties: Observation without Alteration

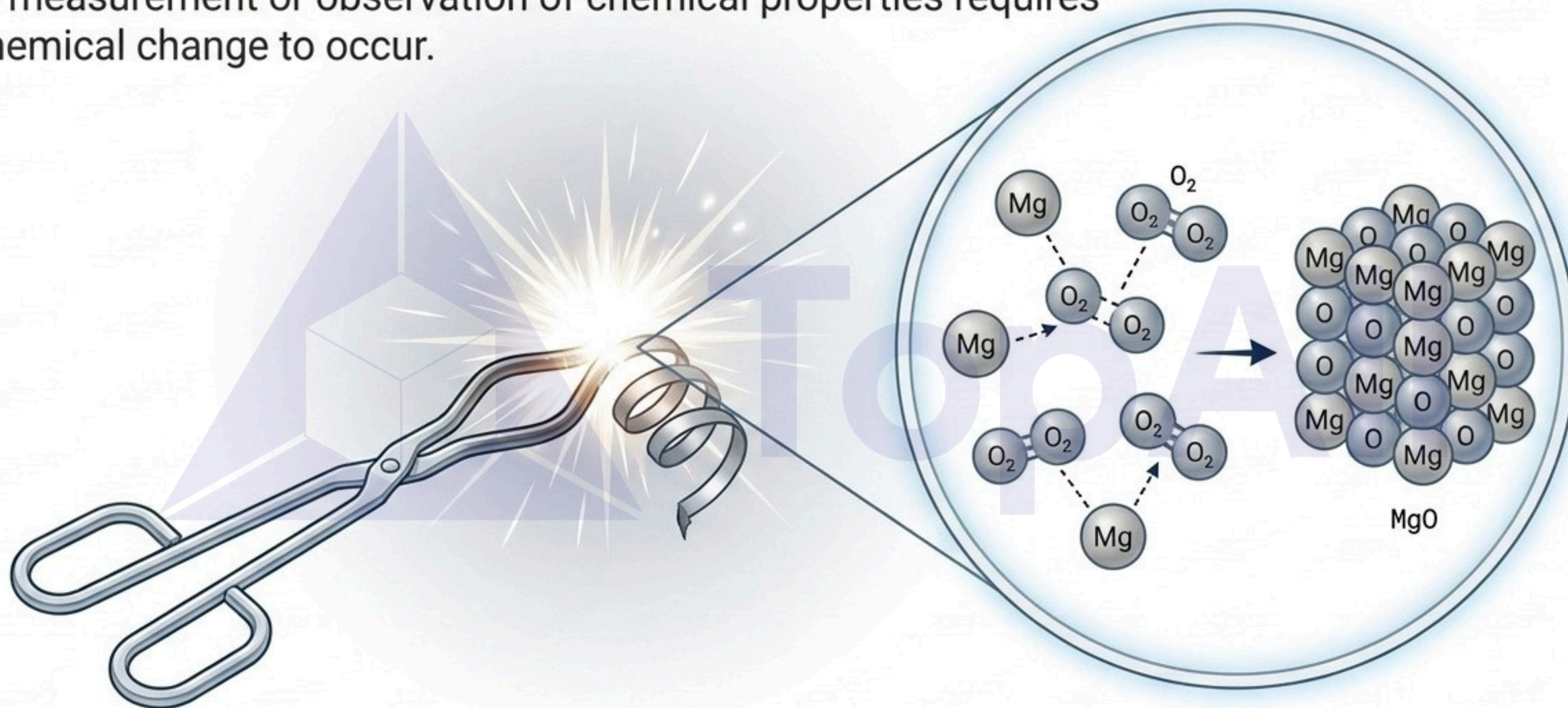
Physical properties can be measured or observed without changing the identity or the composition of the substance.



If the molecular formula stays the same during observation, you are measuring a physical property.

Chemical Properties: The Test of Transformation

The measurement or observation of chemical properties requires a chemical change to occur.



If the observation creates a new chemical formula, you are measuring a chemical property.



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$$E=mc^2$$



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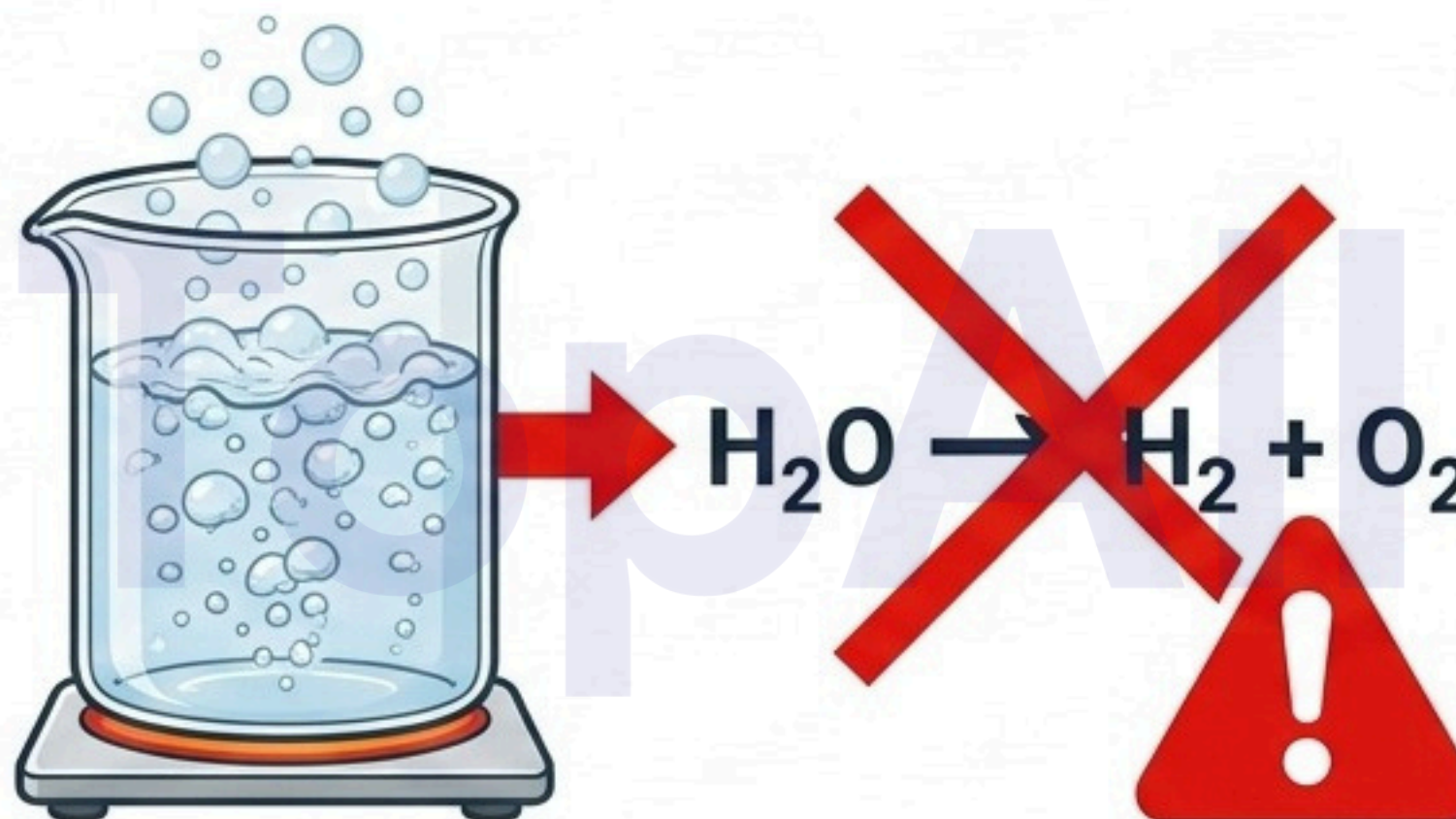
The Rule Bank: Property Categorization

PHYSICAL PROPERTIES	CHEMICAL PROPERTIES
◦ Colour ◦ Odour ◦ Melting Point ◦ Boiling Point ◦ Density ◦ Volume	◦ Composition ◦ Combustibility ◦ Reactivity with acids ◦ Acidity/Basicity

Beware the Illusion of Chemical Change

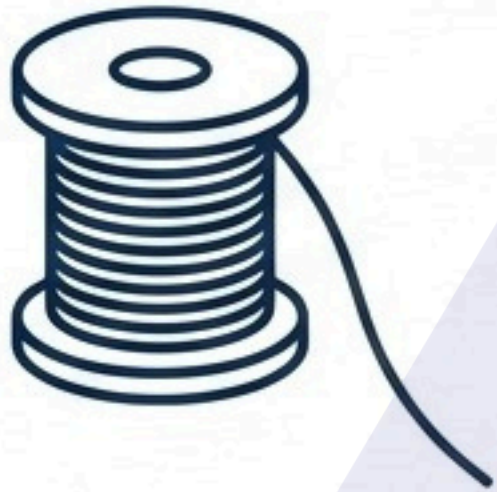
Visible change $\neq$ Chemical change.

Just because a substance bubbles vigorously or changes color when heated does NOT mean a chemical reaction has occurred. The definitive test is the underlying composition.



Boiling water is a dramatic physical change, but H_2O remains H_2O .

Mini Application: Test Your Lens



Copper drawn into a thin wire.

Answer: Physical
(Ductility)



Paper turning to ash.

Answer: Chemical
(Combustibility)



Sugar dissolving in water.

Answer: Physical
(Solubility/Mixture)



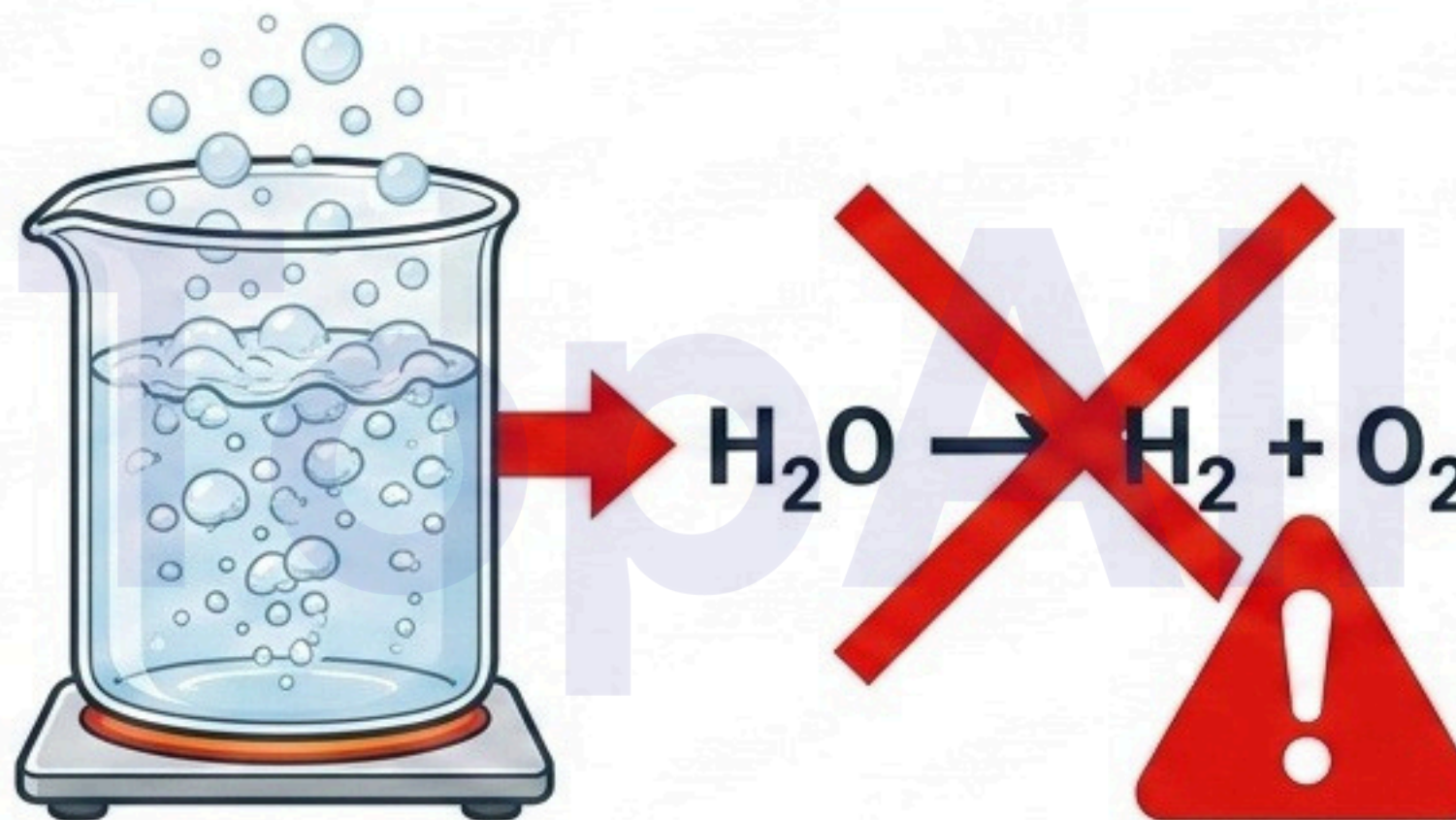
Iron rusting in moist air.

Answer: Chemical
(Reactivity)

Beware the Illusion of Chemical Change

Visible change $\neq$ Chemical change.

Just because a substance bubbles vigorously or changes color when heated does NOT mean a chemical reaction has occurred. The definitive test is the underlying composition.



Boiling water is a dramatic physical change, but H_2O remains H_2O .



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